



10/13 (HE)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICANT: Richard A. Haase

FILED: May 25, 2001

SERIAL NO.: 09/866,145

TITLE: Method for Dewatering Sludge

§ EXAMINER: Hoey, Betsy M.

§ ART UNIT NO.: 1724

§ ATTY DOCKET NO.

§ 27410/02CIPRI

PRELIMINARY AMENDMENT

The Commissioner of Patents and Trademarks

BOX RESPONSES

Washington, DC 20231

Dear Sir:

As noted at paragraph 3 of the Office Action of February 14, 2002, current pending claims 16-38 were added to this application in an improper manner by merely typing them in underlined form to the end of a typewritten specification that was submitted with the Reissue application.

Paragraph 3 of the Office Action of February 14, 2002 is requiring "a supplemental paper correctly amending the reissue application."

Responsive to that paragraph 3, this "Preliminary Amendment" is respectfully submitted.

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AMENDMENTS

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PLEASE DELETE CURRENTLY PENDING CLAIMS 16-38.

PLEASE ADD THE FOLLOWING CLAIMS 16-38.

16. A method for dewatering biological sludge that has been digested by a thermophilic digestion process comprising:
 - a. adding a polymeric quaternary ammonium compound to the biological sludge;
and
 - b. adding a polyacrylamide to the biological sludge; such that the combination of a polymeric quaternary ammonium compound and a polyacrylamide and blends thereof enhance the dewatering of the sludge.
17. A method for dewatering biological sludge that has been digested by a thermophilic digestion process comprising:
 - a. adding aluminum sulfate to the biological sludge; and
 - b. adding a polyacrylamide to the biological sludge; such that the combination of aluminum sulfate and a polyacrylamide and blends thereof enhance the dewatering of the sludge.
18. A method for dewatering biological sludge that has been digested by a thermophilic digestion process comprising:
 - a. Adding ferric chloride to the biological sludge; and
 - b. Adding a polyacrylamide to the biological sludge; such that the combination of

the ferric chloride and a polyacrylamide and blends thereof enhance the dewatering of the sludge.

19. The method for dewatering biological sludge according to claim 16, wherein aluminum sulfate is added to the biological sludge, such that the combination of the polymeric quaternary ammonium compound, the aluminum sulfate, and a polyacrylamide and blends thereof enhance the dewatering of the sludge.
20. The method for dewatering biological sludge according to claim 16, wherein ferric chloride is added to the biological sludge, such that the combination of the polymeric quaternary ammonium compound, the ferric chloride, and a polyacrylamide and blends thereof enhance the dewatering of the sludge.
21. The method for dewatering biological sludge according to claim 19, wherein a ferric chloride is added to the biological sludge, such that the combination of the polymeric quaternary ammonium compound, the aluminum sulfate, the ferric chloride, and a polyacrylamide and blends thereof enhance the dewatering of the sludge.
22. The method for dewatering biological sludge according to claim 17, wherein ferric chloride is added to the biological sludge, such that the combination of the aluminum sulfate, the ferric chloride, and a polyacrylamide and blends thereof enhance the dewatering of the sludge.
23. The method for dewatering biological sludge according to claim 16, wherein the polymeric quaternary ammonium compound is from the di-allyl di-methyl ammonium chloride (DADMAC) family.
24. The method for dewatering biological sludge according to claim 17, wherein the

polymeric quaternary ammonium compounds are from epichlorohydrin di-methyl amine (epi-DMA) family.

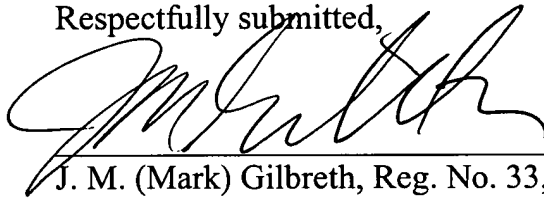
25. The method for dewatering biological sludge according to claim 21, wherein the polymeric quaternary ammonium compound, aluminum sulfate, ferric chloride and blends thereof, are added directly to the sludge and, upon formation of microflocs of the sludge from the polymeric quaternary ammonium compound, aluminum sulfate, ferric chloride and blends thereof, a cationic polyacrylamide is added to form a floc that dewateres the sludge.
26. The method for dewatering biological sludge according to claim 19, wherein ratios of the polymeric quaternary ammonium compound with respect to aluminum sulfate range from about 1:16 to about 1:2.
27. The method for dewatering biological sludge according to claim 20, wherein ratios of the polymeric quaternary ammonium compounds with respect to ferric chloride range from about 1:8 to about 1:10.
28. The method for dewatering biological sludge according to claim 17, wherein ratios of the polyacrylamide with respect to aluminum sulfate range from about 1:80 to about 1:8.
29. The method for dewatering biological sludge according to claim 18, wherein ratios of the polyacrylamide with respect to ferric chloride range from about 1:70 to about 1:7.
30. The method for dewatering biological sludge according to claim 16, wherein polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between about 50 ppm: 1 percent and about 300 ppm: 1 percent.
31. The method for dewatering biological sludge according to claim 21, wherein the

- polymeric quaternary ammonium compound, aluminum sulfate, ferric chloride and blends thereof, are added directly to the sludge, in an amount sufficient to cause formation of a cationic overcharge within a developed micro floc system, and an anionic polyacrylamide is then added for final floc formation.
32. The method for dewatering biological sludge according to claim 16, wherein the polymeric quaternary ammonium compound and the anionic polyacrylamide are in an approximately 1:8 to 20:1 ratio, with the anionic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound does.
33. The method for dewatering biological sludge according to claim 16, wherein polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between approximately 50 ppm: 1 percent and approximately 5000 ppm: 1 percent.
34. The method for dewatering biological sludge according to claim 16, wherein the biological sludge is mixed with primary sludge.
35. The method for dewatering biological sludge according to claim 17, wherein the biological sludge is mixed with primary sludge.
36. The method for dewatering biological sludge according to claim 18, wherein the biological sludge is mixed with primary sludge.
37. A composition for dewatering biological sludge according to claim 21 comprising a polymeric quaternary ammonium compound, aluminum sulfate, ferric chloride and blends thereof, as primary component, and a polyacrylamide, said components being present in the composition in a ratio to enable the composition to function as an agent for

dewatering biological sludge from a thermophilic digestion process.

38. The method for dewatering biological sludge according to claim 21, wherein the polymeric quaternary ammonium compound, aluminum sulfate, ferric chloride and blends thereof, as well as the polyacrylamidee, are used in solution, in emulsion or in dry form.

Respectfully submitted,



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